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Identification of Corn Leaf Diseases Using Unsupervised Learning Algorithms

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ABSTRACT: Accurate diagnosis of corn crop diseases is a complex challenge faced by farmers during the growth and production stages of corn. In order to address this problem, this paper proposes a method based on K-means clustering and an improved deep learning model for accurately diagnosing three common diseases of corn leaves: gray spot, leaf spot, and rust. First, to diagnose three diseases, use the K-means algorithm to cluster sample images and then feed them into the improved deep learning model. This paper investigates the impact of various k values (2,4,8,16,32,and64) and models (VGG-16, ResNet18, Inceptionv3, VGG-19, and the improved deep learning model) on corn disease diagnosis. The experiment results indicate that the method as the most significant identification effect on 32-means samples, and the diagnostic recall of leaf spot, rust, and grey spot diseases 89.24%,100%, and 90.95%,respectively.Similarly,VGG-16 and ResNet18 also achieve the best diagnostic results on 32-means samples, and their average diagnostic accuracy is 84.42% and 83.75%. In addition, Inception v3 (83.05%) and VGG-19 (82.63%) perform best onthe64-meanssamples. For the three corn diseases, the approach in this perhaps an average diagnostic accuracy of 93%. It has a more significant diagnostic effect than the other four approaches and can be applied to the agricultural field to protect crops.

KEYWORDS: Corn leaf disease diagnosis, Deep learning, Transfer learning, K-means clustering.

I. INTRODUCTION

Corn is presently the highest-yielding food crop round the world, a crucial food, and industrial stuff. The stable and healthy development of corn production plays a crucial role in food security, farmers' financial gain growth, and therefore the financial set-up. Corn diseases directly have an effect on its yield and quality. There area unit over a dozen common diseases in corn, most of that occur in leaves, ears, and roots. Among them leaf spots and rust area unit typical. Leaf spot, there area unit oval or rectangular, fusi form lesions on the leaves, with yellow-brown halos around them, 5-10cm long and one.2-1.5 cm wide. Rust malady primarily happens within the middle and higher leaves of the plant. At first, tiny light-yellow dots scattered or clustered on the front of the leaf, then protruded and distended to spherical to rectangular, yellowish-brown, or brown, and therefore the close cuticle turned up. grey leaf spot, conjointly called corn Cercospora leaf spot and corn mildew, could be a lot of severe malady. The initial stage of the malady (sepia, rust, and brown spots) . though sensible results are achieved, they even have disadvantages like problem in feature extraction, poor ability, and weak anti-interference ability. This paper proposes a corn plant disease identification technique supported the K-means clump and deep learning combination to boost corn plant disease identification accuracy, victimization transfer learning to coach the deep learning model and explore totally different K values.

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II. RELATED WORK

Accurate modeling and finding the foremost vital factors within the analysis is one among the desired steps in preprocessing stage. However, the convolutional neural network is critical for feature extraction. It will mechanically extract image options and has sensible ability to image displacement, scaling, and distortion. Therefore, deep learning models square measure applied within the current analysis owing to their glorious effectuality. Deep learning is quickly changing into the quality technology for image classification. it's been applied to several fields like medical image recognition, remote sensing image recognition, autonomous vehicle driving, and face recognition, text bunch, satellite impact crater identification, and age estimation, epidemic bar and management, within the field of agriculture, several studies are conducted on the classification of plant pests and diseases, like tea, apple, rice, mango, cucumber, etc. Saeedetal planned an automatic crop sickness identification system that was evaluated algorithmically on tomato, corn and potato crops. They used partial least sq. (PLS) regression, fusion and choice of options extracted by the CNN model, that were then passed to multiple classifiers to get the ultimate recognition. the common accuracy achieved by the PLS-based fusion and choice methodology is concerning ninety.1%, that not solely improves the popularity accuracy however conjointly reduces the computation time planned a unique suppressor super-resolution methodology (LASSR) specifically for the identification of leaf diseases. LASSR detects and suppresses artifacts to an outsized extent and may generate high-resolution pictures, so the performance of automatic identification of plant leaf diseases. Experiments with this methodology on 5 cucumber diseases showed that coaching with knowledge generated by LASSR considerably improved over twenty first on unseen check knowledge sets compared to baseline.

III. METHODOLOGY

In this paper plant leave disease recognition processes an appropriate and perfect dataset is required. First step of the proposed system is to train the system. A total of 1000 images are collected from different places for train system. And 2000 images are collected for test the system operation. For data set we search from internet. After dataset collection, next procedure is feature extraction. For fracture extraction on the above data convolutional neural network (CNN) used. The process of CNN is different in different images. It is divided into 3 different convocational layer. Each layer presented in between a max-pooling layers. Next step is K-means algorithm which improves by computing new mean values or centroids all the objects are again reassigned using the updated means. It is for partitioning where each cluster center is represented by the mean value of objects in cluster. The input is data set and number of clusters. The output is set of k clusters. The algorithm randomly selects k objects as initial clusters for the remaining objects, an object is assigned to cluster to which it is most similar based on equidistance between cluster object and cluster centers.

K-Means Clustering is for partitioning where each cluster center is represented by the mean value of objects in cluster. The input is data set and number of clusters. The output is set of k clusters. The algorithm randomly selects k objects as initial clusters for the remaining objects, an object is assigned to cluster to which it is most similar based on equidistance between cluster object and cluster centers. K-means algorithm improves by computing new mean values.

Random Forest algorithm there are two steps, in the first stage a random forest creation is produced and in the second step the values that are produced from step one are used and predictions are made. Take different defected plant leave as a training data set. And try to find features in the training data images. Find features that are similar to each other in terms of image attributes, sample spot infected plant leaves, image data samples. Clustering is an unsupervised machine learning method. Clustering can be done in different way. Among the m features calculate the node d which has the best split point. Later split the node into child node and repeat the above steps until k number of nodes has been reached. Build the forest by repeating all the above steps z times

to produce z number of tree.

Anaconda is the installation program used by Fedora, Red Hat Enterprise Linux and some other distributions. During installation, a target computer's hardware is identified and configured and the appropriate file systems for the system's architecture are created. Finally, anaconda allows the user to install the operating system software on the target computer. Anaconda can also upgrade existing installations of earlier versions of the same distribution. After the installation is complete, you can reboot into your installed system and continue doing customization using the initial setup program. Anaconda is a fairly sophisticated installer. It supports installation from local and remote sources such as CDs and DVDs, images stored on a hard drive, NFS, HTTP, and FTP. Installation can be scripted with kick start to provide a fully unattended installation that can be duplicated on scores of machines. It can also be run over VNC on headless machines. A variety of advanced storage devices including LVM, RAID, ISCSI, and multipath are supported from the partitioning program. Anaconda provides advanced debugging features such as remote logging, access to the python interactive debugger, and remote saving of exception dumps.

IV. EXPERIMENTAL RESULTS

Figure shows the results of Identification Of Corn Leaf Diseases Using Unsupervised Learning Algorithms. The figure(A) shows the leaf disease image, figure (B) tells about Image preprocessing using K-Means clustering algorithm, figure (C) describes about the predetermined number of clusters and figure (D) shows the final output.

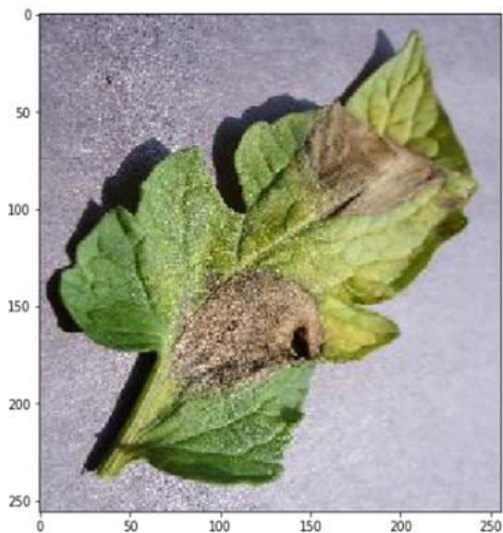


FIGURE [A]

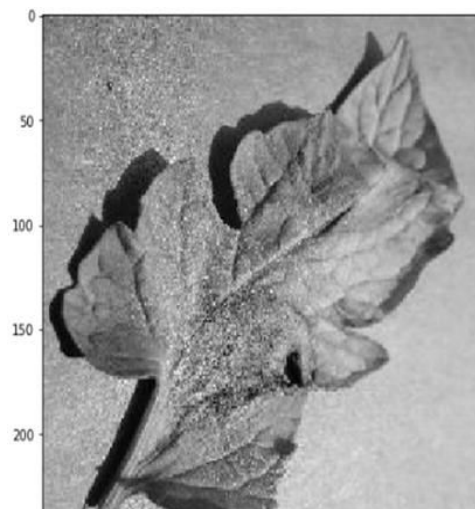


FIGURE [B]

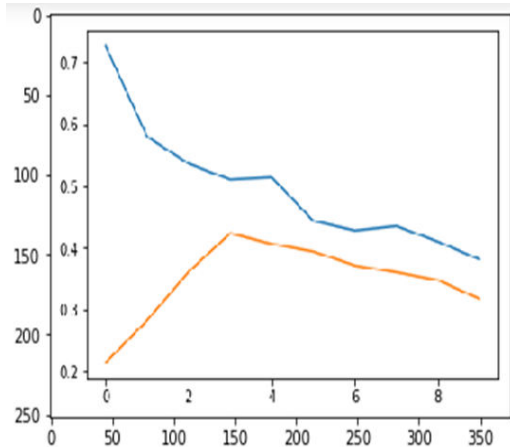


FIGURE [C]

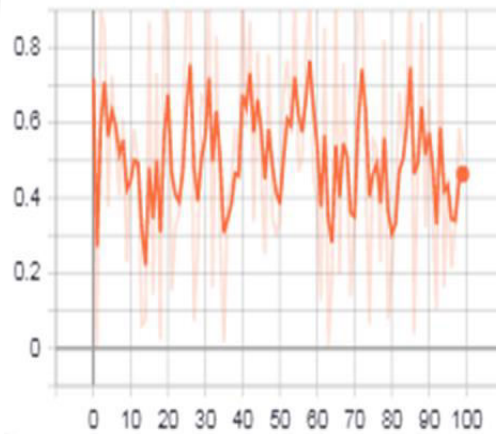


FIGURE [D]

V. CONCLUSION

The proposed method of approaching is a precious approach, which can be give better performance. K-mean algorithm didn't work well in global cluster and it does not work well with cluster of different data size and different data density. So that after clustering if we give the clusters in the multiple SVM class then it is give better classification. In the performance analysis this hybrid algorithm is better than individual algorithms performance. In this method it is found that big amount of dataset can be easily trained and tested to predict the different diseases. Now in daily life, this kind of approached is very useful. In the agriculture medical fields it will very helpful because using this proposed system very minimal amount of pesticides can be used to the plants.

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